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4

FOREST PEST MANAGEMENT



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INTERMOUNTAIN ZONE

AN EVALUATION OF HAZARD TREES IN THE WHEELER PEAK CAMPGROUND,
ELY RANGER DISTRICT, HUMBOLDT NATIONAL FOREST

By
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INTRODUCTION

The Wheeler Peak Campground is located at the end of Forest Road 446, west of Baker, Nevada and Lehman Caves National Monument, near the trailhead to Wheeler Peak. The campground is near 10,000-foot elevation and receives moderate use during the summer months. It is heavily forested with a mixture of Engelmann spruce (*Picea engelmannii*), aspen (*Populus tremuloides*), and limber pine (*Pinus flexilis*). The only shrubs found in the forested parts of the campground are occasional mountain junipers (*Juniperus communis*). There are some grasses and forbs forming sparse ground cover. The lack of underbrush and ground cover is probably due to the heavy shade from numerous trees.

The 37 campsites are well-developed with blacktop parking areas and concrete pads for tables and cooking facilities.

Some hazard trees have been removed, but additional treatment is necessary. District personnel are presently preparing a vegetation management plan to include removal of hazard trees, replanting of open spots in the campground, and establishment of shrubs. This report will present the results of a survey for hazard trees in the campground.

METHODS

A FPM field crew consisting of LaGrande Hobbs, Pathologist; Ann Keysor, John Anhold, and Faerthen Felix, Biological Technicians; and Al Miller, Forestry Technician from the Ely District, examined the Wheeler Peak Campground on August 3 and 4 to determine causes and extent of tree mortality and to evaluate tree hazards facing recreationists.

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EXPERIMENT STATION

All trees within striking distance of camp pads, parking areas, restrooms, water faucets, and roads were examined for signs of disease or defect. External signs of decay include fungus fruiting bodies (conks or mushrooms), basal cavities, exposed roots, bole cankers, wounds, frost cracks, lightning scars, and dead tops. Tree hazard evaluation forms, developed by FPM in Region 2 (Johnson 1981), were used during the survey (Appendix). Each tree evaluated received scores for species, potential targets, and visible defect(s) present. The product of these scores was the "risk rating" for that tree. Living trees with a medium or high risk rating were bored with an increment borer to determine amount of decayed and sound wood. Trees with a low risk rating were thumped with the blunt end of a hatchet. If a low, hollow sound was produced, that tree was also bored. The extracted cores were examined to determine the thickness of the outer shell of sound wood. If this outer shell of sound wood was thinner than that required to maintain two-thirds of original strength (Fig. 2), the tree was marked for recommended removal by nailing a small, numbered, metal tag at eye level on the side of the tree away from the camp pad or road, and recording on a site map (Fig. 1) and data sheets (Appendix). When there was an internal decay column too small to indicate immediate removal, the tree was also tagged with a metal tag, marked on the map, and recorded for future observation in 2 or 5 years. Dead trees were not tagged but were marked on the map for removal--some for immediate removal and others for removal later this fall.

RESULTS

A total of 81 living trees were recorded for treatment or observation (Fig. 1 and Appendix). Of these, 62 are to be removed, 1 topped, and 18 observed. In addition, 250 dead trees (mostly aspen) were found. All of the dead trees need to be removed.

Most of the aspen mortality in the campground is due to canker diseases, primarily sooty bark canker caused by Cenangium singulare. A few cases of Cytospora canker and Ceratocystis canker were found. These cankers girdle and kill the tree, and it eventually falls. Most of the dead aspens were killed this way, and there are 17 aspen trees which will be dead within a year. The other seven aspen trees marked for removal have serious heart rot, root rot, or butt rot. A high percentage of the aspen trees not marked for removal but recorded for observation have canker infections in various stages of development.

The most common problem in Engelmann spruce is heart rot. Twenty-five trees were marked for removal due to weakening by heart rot. One has root rot; one, an unnatural lean; and one has been killed by spruce bark beetles.

All but one of the limber pines (10) marked for removal have serious heart rot. One limber pine was found infested with mountain pine beetle.

DISCUSSION AND RECOMMENDATIONS

Of the three tree species in Wheeler Peak Campground, the aspen is in the poorest condition. Most of the 250 dead trees are aspen, and 24 living trees are in need of removal. A large proportion of the remaining mature aspen are infected by canker fungi. These trees will likely die within the next 10 years. There are numerous young aspen sprouts growing in most openings in the campground. These will serve to replace the dying older aspen trees. This process

could be accelerated by cutting most of the aspen in a clone, living or dead, over 1 foot tall. This effectively increases the regeneration of root sprouts. (Walters et al. 1982). In some areas of the campground, this would be rather risky since aspen makes up a good portion of the tree cover and removing it would drastically reduce shade.

It may be interesting to test the effects that clearcutting has on the regeneration of aspen clones. There is one area in the campground where this could be done without major impact to the campground. This area is located east of unit 15 on the road just before the end loop in the campground (Fig..1).

There is a rather dense stand of spruce and limber pine in most of the campground, so cutting the hazardous trees should have little overall effect. However, in some areas, larger than desirable openings may be created. In these areas, it will be helpful to plant replacement trees. The preferred tree for planting would be 3- or 4-foot limber pine. If this is not possible, Engelmann spruce would be the second choice. Limber pine is less prone to root rots and other problems encountered in campgrounds. It may be helpful to try other "exotic" species to set a broader mix in the vegetation--perhaps high-altitude lodgepole pine, sugar pine, or whitebark pine. Of course, aspen will sprout in the openings and replace the cover, but aspen alone can lead to future problems. Aspen can only be expected to survive in a campground for 30-35 years.

Of special note was the spruce tree killed by spruce bark beetle. This tree should be removed this fall to reduce the numbers of bark beetles moving to other trees. In addition, all spruce trees cut this fall should be removed next spring and summer, along with the slash. If this is not done, bark beetles could build up and become epidemic, killing large numbers of spruce.

LITERATURE CITED

- Baker, Frederick S. 1925. Aspen in the central Rocky Mountain Region. USDA Bulletin 1291, 46 p., Washington D.C.
- Johnson, D. W. 1981. Tree hazards: Recognition and Reduction in Recreation Sites. USDA Forest Service, Rocky Mountain Region, Forest Pest Management, Technical Report, R-2-1., 17 p.
- Walters, James W., Thomas E. Hinds, David W. Johnson, and Jerome Beatty. 1982. Effects of partial cutting on diseases, mortality, and regeneration of Rocky Mountain aspen stands. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Research Paper, RM-240. 12p.

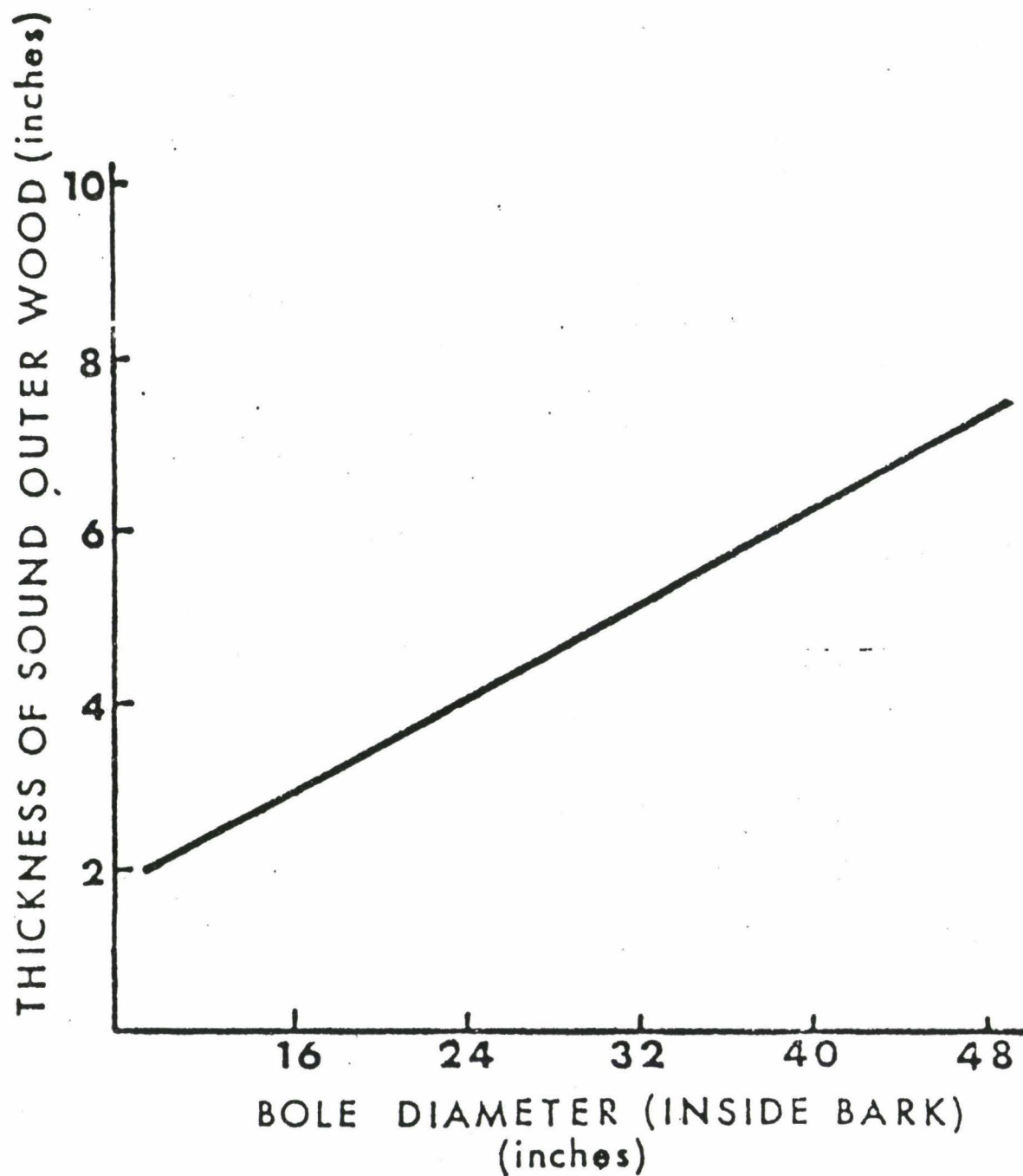


Figure 2 - Thickness of sound wood in outer shell required to maintain 66% of original strength in trees with heart rot (modified from Wagener, 1963). If the amount of sound wood exceeds that established by the line on the graph, the tree can be considered relatively safe from failure. Reprinted from Johnson (1981).

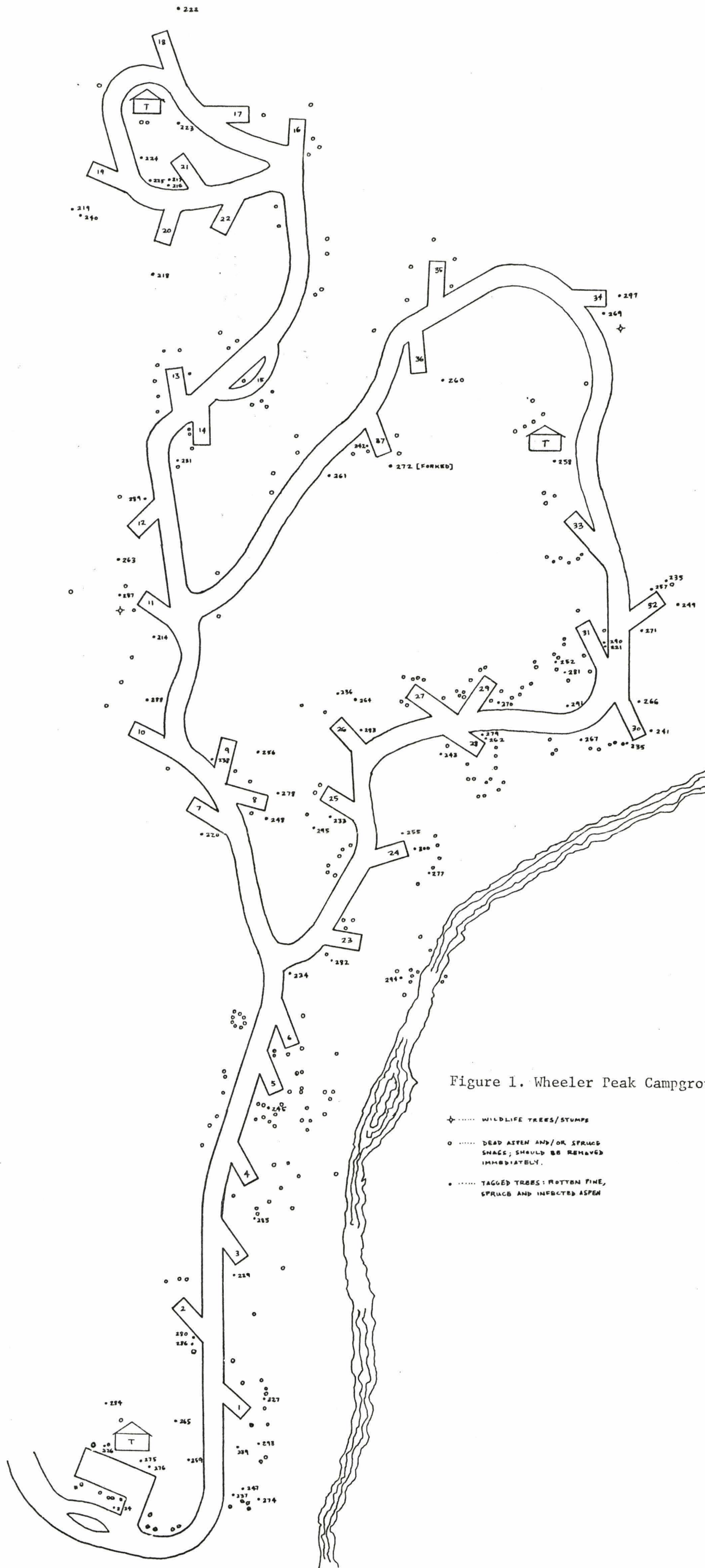


Figure 1. Wheeler Peak Campground Site Map

APPENDIX

(Tree Hazard Forms for Wheeler Peak Campground)

TREE HAZARD EVALUATION

FOREST: Humboldt DISTRICT: Ely SITE NAME: Wheeler Peak C.G.
 DATE OF INSPECTION: 8-3-83 EVALUATED BY: FPM - Hobbs, Keyser, Anhold, Felix
 REVIEW AND COMMENTS BY: _____
 (District Ranger)

UNIT NO.		MAP NO.		TREE NO.		D.B.H. (MINIMUM 7")		RISK VALUE		Trail head		ROAD		H2O TAP		1		2		2	
1/	UNIT NO.	MAP NO.		TREE NO.		D.B.H. (MINIMUM 7")		RISK VALUE		Trail head		ROAD		H2O TAP		1		2		2	
	1		1		1		1		1		1		1		1		1		1		
	224		226		275		276		237		247		274		239		293		265		
	24		39		7		45		19.5		16		10		20		10		22		
TREE SPECIES	A	Pinyon, junipers, scrub oak		1																	
	A	ponderosa pine, 5-needle pines, Douglas fir		2		LP		LP		LP		LP									
	A	Spruce/fir, aspen, cottonwood, lodgepole pine		3				Asp		ES		Asp		ES		Asp		ES		Asp	
POTENTIAL TARGET(S)	B	trails (low use), signs, etc.		1																	
	B	temporary structures, trails (heavy use)		2						X		X		X		X		X			
	B	permanent structures, parked vehicles, people		3		X		X		X		X						X		X	
DEFECT(S) PRESENT	C	no visible defect		0																	
	C	slime flux, small mechanical injury		1																	
	C	limb defects, brooms, frost cracks, lightning scars, large mechanical wounds, forked trees, bole cankers		2				X				X				X					
	C	exposed roots, bole cankers (decayed), dead top, conks, punky knots, butt rot, basal cavity, leaner (unnatural), root rot, dead trees		3		X		X		X		X		X		X		X		X	
RISK RATING	3/ Ax	HIGH (21-27)		X		X		X										X		X	
	Bx	MED (10-20)						X		X		X		X		X		X			
	C	LOW (0-9)																			
INTERNAL INSPECTION	4/	increment borings (yr.) taken		83		83		83		83		83		-		83		83		-	
	4/	inches sound wood		7		4		4		All		4		1		All		3.5		5	
	4/	year next boring recommended		85				-						-							
RECOMMENDED ACTION		Fell				X		X				X		X				X		X	
		Top																			
		Prune						?													
		Remove Target																			
		Observe				X				X		X				X		X			
		None																			
		Other																			
	Date Corrective Action Taken																				

- 1/ Prepare map of hazard tree location on reverse side of form.
- 2/ Any tree with a risk value of 1 or 2 may require increment boring, a value of 3 requires increment boring.
- 3/ To determine Risk Rating (High, Medium, Low) for each tree evaluated, sum risk values (1, 2, & 3) under A, B, C (value not to exceed 3) and multiply sums A*B*C (i.e. Risk Rating cannot exceed 27).
- 4/ Tree Hazards: Recognition and Reduction in Recreation Sites, Rocky Mtn. Tech. Rep. R2-1 (Revised 1981) See Figure 7.

LP: Limber Pine
 Asp: Aspen
 ES: Engelmann Spruce

COMMENTS

Heart Rot - Lean
 Heart Rot - Dead top
 Heart Rot - Root Rot
 Dead Branches
 Heart Rot
 Heart Rot
 Girdling Canker
 Dead Branches
 Girdling Canker
 Heart Rot
 Heart Rot - Some lean
 Canker - remove when dead
 Girdling Canker
 Dead Snag - Leaning - very soon
 Girdling Canker
 Girdling Canker

TREE HAZARD EVALUATION

FOREST: Humboldt DISTRICT: Ely SITE NAME: Wheeler Peak C. G.
 DATE OF INSPECTION: 8-3-83 EVALUATED BY: R-4 FPM
 REVIEW AND COMMENTS BY: _____
 (District Ranger)

		UNIT NO.	RISK VALUE																	
		MAP NO.	2	3	4	5	Food Fork	23	23	23	24	24	24	25	25	25	26	26		
		TREE NO.	1	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3		
		D.B.H. (MINIMUM 7")	280	229	285	245	234	282	268	294	300	277	255	253	273	295	283	264		
			13.5	26	32	10	11	14.5	13	31	9	22.5	34	23	-	17.5	11.5	14		
TREE SPECIES	A	Pinyon, junipers, scrub oak	1																	
		ponderosa pine, 5-needle pines, Douglas fir	2								LP			LP	LP					
		Spruce/fir, aspen, cottonwood, lodgepole pine	3	ES	ES	ES	ASP	ASP	ASP	ASP		ASP	ES			ASP	ES	ASP		
POTENTIAL TARGET(S)		trails (low use), signs, etc.	1																	
		temporary structures, trails (heavy use)	2					X												
		permanent structures, parked vehicles, people	3	X	X	X	X		X	X	X	X	X	X	X	X	X	X		
DEFECT(S) PRESENT		no visible defect	0																	
		slime flux, small mechanical injury	1																	
	2/	limb defects, brooms, frost cracks, lightning scars, large mechanical wounds, forked trees, bole cankers	2										X							
		exposed roots, bole cankers (decayed), dead top, conks, punky knots, butt rot, basal cavity, leaner (unnatural), root rot, dead trees	3	X	X	X	X	X	X	X	X	X		X	X	X	X	X		
RISK RATING	3/	HIGH (21-27)		X	X	X	X		X	X		X		X	X	X	X	X		
	Bx	MED (10-20)						X			X		X							
	C	LOW (0-9)																		
INTERNAL INSPECTION		increment borings (yr.) taken		83	83	83	-	-	-	-	83	-	83	83	83	-	83	83		
	4/	inches sound wood		6	1.5	1					2		All	1	2		1.5	2.5		
		year next boring recommended		88																
RECOMMENDED ACTION		Fell			X	X	X	X	X	X	X	X		X	X	X	X	X		
		Top																		
		Prune																		
		Remove Target																		
		Observe		X									X							
		None																		
		Other																		
		Date Corrective Action Taken																		
		COMMENTS	Heart Rot (small column) Heart Rot - Lean - Cut Soon Heart Rot - Forked - Cut Soon Girdling Canker Butt Rot - mushrooms Butt Rot Girdling Canker - Dead Top Heart Rot Girdling Canker Dead Branches Heart Rot Heart Rot Girdling Canker Heart Rot - Forked - Forks Heart Rot - Leaner Girdling Canker																	

- 1/ Prepare map of hazard tree location on reverse side of form
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 ASP: ASPEN
 ES: Engelmann Spruce

TREE HAZARD EVALUATION

FOREST: Humboldt DISTRICT: Ely SITE NAME: Wheeler Peak C.G.
 DATE OF INSPECTION: _____ EVALUATED BY: R-4 FPM
 REVIEW AND COMMENTS BY: _____
 (District Ranger)

		UNIT NO.	RISK VALUE															
		MAP NO.	26	28	28	28	29	Road	30	30	Road	30	30	31	31	31	31	32
		TREE NO.	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		D.B.H. (MINIMUM 7")	236	243	262	279	270	267	235	230	291	241	266	281	252	221	290	257
			10	28	31	20	21.5	18	235	10	20.5	14	9	15	23	11.5	16	11
TREE SPECIES	A	Pinyon, junipers, scrub oak	1															
		ponderosa pine, 5-needle pines, Douglas fir	2		LP					LP			LP					
		Spruce/fir, aspen, cottonwood, lodgepole pine	3	ASP		ES	ES	ES	ES		ASP	ES		ES	ES	ES	ES	ES
POTENTIAL TARGET(S)		trails (low use), signs, etc.	1															
	B	temporary structures, trails (heavy use)	2						X			X			TENT AREA			
		permanent structures, parked vehicles, people	3	X	X	X	X	X		X	X		X	X	X	X	X	X
DEFECT(S) PRESENT		no visible defect	0															
		slime flux, small mechanical injury	1															
	C	limb defects, brooms, frost cracks, lightning scars, large mechanical wounds, forked trees, bole cankers	2															
		exposed roots, bole cankers (decayed), dead top, conks, punky knots, butt rot, basal cavity, leaner (unnatural), root rot, dead trees	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
RISK RATING	3/Ax	HIGH (21-27)		X		X	X	X			X			X	X	X	X	X
	Bx	MED (10-20)			X				X	X		X	X					
	C	LOW (0-9)																
INTERNAL INSPECTION	4/	increment borings (yr.) taken		83	83	83	83	83	83	83	-	83	83	-	83	83	83	83
		inches sound wood		2	4	5	1/2	5	3	3		2	2.5		4	2.5	1.5	1.5
		year next boring recommended				85		85							85			
RECOMMENDED ACTION		Fell		X	X		X		X	X	X	X	X	X		X	X	X
		Top																
		Prune																
		Remove Target																
		Observe				X		X						X				
		None																
		Other																
		Date Corrective Action Taken																

- 1/ Prepare map of hazard tree location on reverse side of form.
- 2/ Any tree with a risk value of 1 or 2 may require increment boring; a value of 3 requires increment boring.
- 3/ To determine Risk Rating (High, Medium, Low) for each tree evaluated, sum risk values (1, 2, & 3) under A, B, C (value not to exceed 3) and multiply sums A*B*C (i.e. Risk Rating cannot exceed 27).
- 4/ Tree Hazards: Recognition and Reduction in Recreation Sites, Rocky Mtn. Tech. Rep. R2-1 (Revised 1981) See Figure 7.

LP: Limber Pine
 Asp: Aspen
 ES: Engelmann Spruce

COMMENTS	26	28	28	28	29	Road	30	30	Road	30	30	31	31	31	31	31	32
Heart Rot																	
Heart Rot - Bad top																	
Heart Rot - Watch Closely																	
Heart Rot																	
Heart Rot - Dead top Watch closely																	
Cat face - Heart Rot																	
Heart Rot																	
Canker - Bad lean over Table																	
Heart Rot																	
Heart Rot Both forks																	
Leaner																	
Heart Rot																	
Heart Rot - Fell South Fork Observe North Fork																	
Heart Rot																	
Heart Rot																	
Heart Rot - Cut Both Forks																	

TREE HAZARD EVALUATION

FOREST: Humboldt DISTRICT: Ely SITE NAME: Wheeler Peak C.G.
 DATE OF INSPECTION: 8-3-83 EVALUATED BY: R-4 FPM
 REVIEW AND COMMENTS BY: _____
 (District Ranger)

		UNIT NO.	RISK VALUE																
		MAP NO.	32	32	32	33	34	34	36	37	37	37	7	8	8	9	9	10	
		TREE NO.	4	4	4	5	5	5	6	6	6		7	7	7	7	7	7	
		D.B.H. (MINIMUM 7")	253	271	249	258	297	269	260	242	272	261	220	278	248	238	256	288	
			20	16	22	8	20	30.5	12	11.5	31	29	29	6	40.5	24	27	10.5	
TREE SPECIES	A	Pinyon, junipers, scrub oak	1																
		ponderosa pine, 5-needle pines, Douglas fir	2												LP	LP			
		Spruce/fir, aspen, cottonwood, lodgepole pine	3	ES	ES	ES	ASP	ES	ES	ASP	ASP	ES	ES	ES	ASP		ES	ASP	
POTENTIAL TARGET(S)		trails (low use), signs, etc	1																
	B	temporary structures, trails (heavy use)	2									X						X	
		permanent structures, parked vehicles, people	3	X	X	X	X	X	X	X	X	X		X	X	X	X	X	
DEFECT(S) PRESENT		no visible defect	0																
		slime flux, small mechanical injury	1																
	C	limb defects, brooms, frost cracks, lightning scars, large mechanical wounds, forked trees, bole cankers	2																
		exposed roots, bole cankers (decayed), dead top, conks, punky knots, butt rot, basal cavity, leaner (unnatural), root rot, dead trees	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
RISK RATING	3/Ax	HIGH (21-27)		X	X	X	X	X	X	X	X		X	X			X		
	Bx	MED (10-20)										X			X	X		X	
	C	LOW (0-9)																	
INTERNAL INSPECTION	4/	increment borings (yr.) taken		83	83	83	83	83	83	83	-	83	83	-	-	83	83	83	
		inches sound wood		1/2	1 1/2	6	3	1	6	1 1/2		4	2			2	4.5	2	
		year next boring recommended				88	85		86							85			
RECOMMENDED ACTION		Fell		X	X			X			X	X	X	X	X		X	X	
		Top																	
		Prune																	
		Remove Target																	
		Observe				X	X		X		X					X			
		None																	
		Other																	
	Date Corrective Action Taken																		
			COMMENTS																
			Take out soon																
			HEART ROT Also Dead Snag																
			Take out all 4 Trees																
			Heart Rot																
			Between water and Rest Room																
			Heart Rot - Root Rot																
			Get out soon																
			Heart Rot																
			Not uniform around stalk																
			Butt Rot																
			Canker																
			Heart Rot - Fork - Leaning																
			Heart Rot - Forked																
			Spruce Beetle - Dead																
			Root Rot - Conks																
			Heart Rot																
			Heart Rot																
			Heart Rot																
			Canker - Leaner																

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LP: Limber Pine
 ASP: Aspen
 ES: Engelmann Spruce

TREE HAZARD EVALUATION

FOREST: Humboldt DISTRICT: Ely SITE NAME: Wheeler Peak C.G.
 DATE OF INSPECTION: 8-3-83 EVALUATED BY: R-4 FPM
 REVIEW AND COMMENTS BY: _____
 (District Ranger)

		UNIT NO.	RISK VALUE																			
		MAP NO.	11	11	12	12	14	16	18	REST Room	19	19	19	19	20	20	20	21				
		TREE NO.	8	8	8	8	8	10	10	10	10	10	10	10	10	10	10	10				
		D.B.H. (MINIMUM 7")	287	214	263	289	231	221	222	223	224	225	219	240	216	217	218	215				
			6.5	16.5	22	6	16	8.5	8.5	?	10.5	12	13.5	18.5	22	14	33	11				
TREE SPECIES	A	Pinyon, junipers, scrub oak	1																			
		ponderosa pine, 5-needle pines, Douglas fir	2			LP										LP	LP	LP				
		Spruce/fir, aspen, cottonwood, lodgepole pine	3	Asp	ES		ASP	ES	ASP	Asp	ES	Asp	ES	ES	ES	ES						
POTENTIAL TARGET(S)		trails (low use), signs, etc.	1																			
	B	temporary structures, trails (heavy use)	2					X														
		permanent structures, parked vehicles, people	3	X	X	X	X		X	X	X	X	X	X	X	X	X	X				
DEFECT(S) PRESENT		no visible defect	0																			
		slime flux, small mechanical injury	1																			
	C	limb defects, brooms, frost cracks, lightning scars, large mechanical wounds, forked trees, bole cankers	2										X									
		exposed roots, bole cankers (decayed), dead top, conks, punky knots, butt rot, basal cavity, leaner (unnatural), root rot, dead trees	3	X	X	X	X	X	X	X	X	X		X	X	X	X	X				
RISK RATING	3/Ax	HIGH (21-27)		X	X	X	X		X	X	X	X		X	X	X						
	Bx	MED (10-20)						X					X			X	X	X				
	C	LOW (0-9)																				
INTERNAL INSPECTION	4/	increment borings (yr.) taken		83	83	-	83	-	-	-	-	83	83	83	83	83	83	83				
		inches sound wood		2	8		3/4"					All	1.5	4.5	1.5	3.5	1.5	1.5				
		year next boring recommended											85		85							
RECOMMENDED ACTION		Fell		X	X		X	X	X	X		X		X		X		X				
		Top									X											
		Prune																				
		Remove Target																				
		Observe				X							X		X		X					
		None																				
		Other																				
		Date Corrective Action Taken																				

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 Asp: Aspen
 ES: Engelmann Spruce

COMMENTS	11	11	12	12	14	16	18	REST Room	19	19	19	19	20	20	20	21
Girdling Canker																
Heart Rot																
Leaner - Exposed Roots																
Girdling Canker																
Remove Snag and Snag next to it																
Heart Rot																
Top Dead - Rest will be dead																
Girdling Canker																
Top Dead																
Girdling Canker																
Fading top																
Heart Rot																
Heart Rot																
Heart Rot																
Heart Rot																
Heart Rot																
Heart Rot																
Heart Rot																